AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. Contract ID Code	Page	Of
Cost-Plus-Fixed-Fee	1	22

2. Amendment/Modification No.	3. Effective Date	4. Requisition/Purchase Req No.	5. Project No. (If applicable)
P00020	2003DEC23	SEE SCHEDULE	

6. Issued By Code W56HZV

TACOM WARREN BLDG 231
AMSTA-AQ-AHEB
GLENN BOICE (586)574-7125
WARREN, MICHIGAN 48397-5000
HTTP://CONTRACTING.TACOM.ARMY.MIL
EMAIL: BOICEG@TACOM.ARMY.MIL

7. Administered By (If other than Item 6) Code S2305A

DCMA DETROIT
U.S. ARMY TANK & AUTOMOTIVE COMMAND
(TACOM)
ATTN: DCMAE-GJD
WARREN, MI 48397-5000

SCD A **PAS** NONE **ADP PT** HQ0337

8. Name And Address Of Contractor (No., Street, City, County, State and Zip Code)

GENERAL DYNAMICS LAND SYSTEMS INC.
38500 MOUND ROAD
STERLING HEIGHTS, MI. 48310-3260

TYPE BUSINESS: Large Business Performing in U.S.

Code 7W356 **Facility Code**

☐ **9A. Amendment Of Solicitation No.**

9B. Dated (See Item 11)

☒ **10A. Modification Of Contract/Order No.**

DAAE07-01-C-N087

10B. Dated (See Item 13)
2001JUL18

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ **The above numbered solicitation is amended as set forth in item 14. The hour and date specified for receipt of Offers**
☐ **is extended,** ☐ **is not extended.**

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods: (a) By completing items 8 and 15, and returning _____ copies of the amendments: (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. Accounting And Appropriation Data (If required)
ACRN: AD NET INCREASE: $163,164.00

13. THIS ITEM ONLY APPLIES TO MODIFICATIONS OF CONTRACTS/ORDERS

KIND MOD CODE: G

It Modifies The Contract/Order No. As Described In Item 14.

☐ **A. This Change Order is Issued Pursuant To: The Changes Set Forth In Item 14 Are Made In The Contract/Order No. In Item 10A.**

☐ **B. The Above Numbered Contract/Order Is Modified To Reflect The Administrative Changes (such as changes in paying office, appropriation data, etc.) Set Forth In Item 14, Pursuant To The Authority of FAR 43.103(b).**

☒ **C. This Supplemental Agreement Is Entered Into Pursuant To Authority Of:** "CHANGES" clause

☐ **D. Other (Specify type of modification and authority)**

E. IMPORTANT: Contractor ☐ **is not,** ☒ **is required to sign this document and return _____ copies to the Issuing Office.**

14. Description Of Amendment/Modification (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

SEE SECOND PAGE FOR DESCRIPTION

Contract Expiration Date: 2004DEC31

Except as provided herein, all terms and conditions of the document referenced in item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. Name And Title Of Signer (Type or print)		16A. Name And Title Of Contracting Officer (Type or print)	
		JOHN REGENHARDT REGENHAJ@TACOM.ARMY.MIL (586)574-6973	
15B. Contractor/Offeror	**15C. Date Signed**	**16B. United States Of America**	**16C. Date Signed**
_____ **(Signature of person authorized to sign)**		**By** /SIGNED/ **(Signature of Contracting Officer)**	2003DEC23

SECTION A - SUPPLEMENTAL INFORMATION

1. The purpose of this Modification P00020 is to definitize Change Order Mod P00015 that previously incorporated the following changes at not-to-exceed ceiling amounts:

a. Alternate Engine Inlet Air Design effort was previously incorporated at a ceiling amount of $740,644.00. The parties agree that the negotiated CPFF adjustment for this effort is $106,077.00 (Estimated Cost $96,134 plus COM $330 plus Fixed Fee $9,613) based on the revised paragraph C.2.5.1.4.3 incorporated herein, which reflects what was done before the PCO stop-work order dated 3 Nov 03.

b. Ground Hop Modification Kits effort was previously incorporated at a ceiling amount of $96,572.00. The parties agree that the negotiated CPFF adjustment for this effort is $57,077.00 (Estimated Cost $51,727 plus COM $177 plus Fixed Fee $5,173).

c. Contract paragraph C.2.7.1.5.1, PRODUCT DRAWINGS, was previously incorporated at a ceiling amount of $0 (subject to downward equitable adjustment only). The parties agree that the negotiated CPFF adjustment for this effort is $0.

2. As a result of the above paragraph changes, the incremental funding schedule set forth in Provision B.1 is revised as follows:

	CY 01	CY 02	CY 03	CY 04	TOTAL
PREVIOUS Provision B.1 Funding Schedule:	$25,765,688	$33,562,535	$18,626,801	$5,705,948	$83,660,972
Definitization of Mod P00015:	$ -0-	$ -0-	$ 163,154	$ -0-	$ 163,154
* REVISED Provision B.1 Funding Schedule:	$25,765,688	$33,562,535	$18,789,955	$5,705,948	$83,824,126

* REVISED funding schedule amounts do not include pending adjustments (reference not-to-exceed ceiling amounts totaling $741,346 for change order Modifications P00014 and P00019) for authorized actions that are not yet negotiated and definitized.

3. The total CPFF adjustment resulting from above paragraph 1 is $163,154.00. The breakdown of this adjustment and resulting adjustment to contract totals for CLIN 0001 are shown below:

	PRIOR CONTRACT	INCREASE THIS MOD	REVISED CONTRACT
Estimated Cost:	$75,530,836.00	$147,861.00	$75,678,697.00
COM:	$ 577,052.00	$ 507.00	$ 577,559.00
Fixed Fee:	$ 7,553,084.00	$ 14,786.00	$ 7,567,870.00
TOTAL:	$83,660,972.00	$163,154.00	$83,824,126.00

4. As a result of this modification, the total obligated amount allotted to this incrementally-funded contract and the total contract value are increased by $163,154.00 from $83,660,972.00 to $83,824,126.00.

5. The CPFF adjustment of $106,077.00 for Alternate Engine Inlet Air Design includes all effort through 3 Nov 03, the date of the PCO stop-work order on LV100 integration effort. Consequently, the applicable contract paragraph C.2.5.1.4.3 is revised by this modification to reflect only what was done before the PCO stop-work order dated 3 Nov 03. The Contractor would be entitled to an additional equitable adjustment should the PCO subsequently cancel the stop-work order and direct the Contractor to complete the Alternate Engine Inlet Air Design effort in accordance with the original paragraph C.2.5.1.4.3.

6. In implementation of the above, the following contract pages are deleted and added. The added pages are attached to this modification.

	DELETE	ADD
Section B	B1, B3b, B5	B1, B3b, B5
Section C	C4 - C15	C4 - C15
Section G	--	G10

7. This modification constitutes the complete equitable adjustment for Change Order Modification P00015 and the contractor waives any and all claims for further equitable adjustments attributable to facts and circumstances giving rise to that modification and to the related contract paragraph revision as described in paragraph 5 above.

8. All other terms and conditions of the Contract are unchanged and remain in full force and effect.

*** END OF NARRATIVE A 021 ***

Name of Offeror or Contractor: GENERAL DYNAMICS LAND SYSTEMS INC.

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	SECTION B - SUPPLIES OR SERVICES AND PRICES/COSTS				
0001	ABRAMS LV100 ENGINE INTEGRATION*				
	SECURITY CLASS: Unclassified				
	Contract Total Estimated Cost: $75,678,697.00 *				
	Contract Cost of Money (COM): $ 577,559.00 *				
	Contract Total Fixed Fee: $ 7,567,870.00 *				
	Total Contract Amount: $83,824,126.00 *				
	Reference B.1.2. for the Funding Schedule and G.1. for DFAS payment instructions.				
	* Changed by Mod P00020; Page previously changed by Mod P000018				
	(End of narrative B001)				

Name of Offeror or Contractor: GENERAL DYNAMICS LAND SYSTEMS INC.

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0001AD	CY2003 FUNDING FOR CLIN 0001				$ 15,824,136.00

CLIN CONTRACT TYPE:
Cost-Plus-Fixed-Fee
NOUN: GDLS - LV100 INTEGRATION
PRON: A136M58147 PRON AMD: 05 ACRN: AD
AMS CD: 27373533000

Inspection and Acceptance
INSPECTION: Destination ACCEPTANCE: Destination

Deliveries or Performance

DLVR SCH REL CD	QUANTITY	PERF COMPL DATE
001	0	31-DEC-2003

$ 15,824,136.00

B.1. PLANNED CONTRACT FUNDING SCHEDULE

b.1.1. Requirements. The Government shall provide funds under this Contract covering the estimated cost and fee on an incremental basis as provided for in the following schedule and pursuant to the Clause entitled Limitation of Funds. It is estimated that the incremental amounts are sufficient for the performance of work in each of the cited periods. The Government may, at its discretion, provide funds on an incremental basis within each Calendar Year. The Contractor shall so plan and execute the work required by this Contract so as to expend and/or commit funds compatible with the proposed schedule below. Whenever the Contractor has reason to believe that funds obligated to any Calendar year are either insufficient or excessive for the performance of work required in that calendar year, the Government shall be notified.

B.1.2. Funding Schedule.

PERFORMANCE PERIOD	AMOUNT
June 1, 2001 through 31 Dec, 2001	$25,765,688
CLIN 0001	
Jan 1, 2002 through 31 Dec, 2002	$33,562,535
CLIN 0001	
Jan 1, 2003 through 31 Dec, 2003	$18,789,955 *
CLIN 0001	
Jan 1, 2004 through 31 Dec, 2004	$ 5,705,948
CLIN 0001	

The funding requirement lines above represent the total cumulative amounts by funding period and by line item for all awarded CLINs shown elsewhere in Section B of this Contract.

The current funded (obligated) amount allotted to this Contract is: $83,824,126.00 *

* Changed by Modification P00020; Page previously changed by Mod P00018.

*** END OF NARRATIVE B 001 ***

SECTION C - DESCRIPTION/SPECIFICATIONS/WORK STATEMENT

SECTION C
Statement of Work

C.1.0 General Description. The Government Abrams/Crusader Common Engine Program (hereinafter "ACCE"), is developing a common engine which will be provided as GFE ("B Kit") for integration into the Abrams and Crusader platforms. The ACCE program will also provide an Abrams Adapter Kit which is required for integration of the common engine into the Abrams platform. The Abrams Adapter Kit will be GFE to the Contractor under this contract.

C.1.0.1. The A kit is defined as the Abrams unique integration hardware developed under this contract. One Abrams A kit will be developed for M1A2 SEP.

C.1.0.2 The B kit is defined as the common engine components that are common to both the Abrams and Crusader platforms. The B kit is delivered GFE under this contract. This kit includes the ACCE .

C.1.0.3 The Abrams Adapter Kit is defined as the Abrams unique integration hardware required for successful integration of the ACCE into the Abrams Tank. One configuration of Abrams Adapter kit will be delivered as GFE under this contract.

C.1.0.4. The "Abrams ACCE" is defined as an Abrams M1A2 SEP tank configured with an ACCE engine.

C.1.1 Contract Objective.

a. The Contractor, acting independently and not as an agent for the United States Government (USG), shall furnish the supplies and services necessary to accomplish the Abrams ACCE integration design effort. The Contractor shall not degrade the vehicle performance as stated in the vehicle's System Performance Specification (Reference: M1A2 SEP SA-SA00001C, dated 31 July 1998) except for known vehicle System Performance Specification, Prime Item Specification or Product Fabrication Specification non-compliance existing at the time of the execution of this Contract.

b. This contract (hereinafter "Contract") provides for the development and integration of the "A Kit and required software, and integration of the GFE B-Kit and GFE Abrams Adapter Kit. The Contractor developed "A Kit", which when coupled with the GFE B-kit and the GFE Abrams Adapter Kit results in the successful integration of the common engine into the M1A2 Abrams SEP vehicle. The Contract also provides for the documentation, testing, and preparation of an ECP for release of the Abrams ACCE design to the Government for approval and incorporation into the Abrams M1A2 SEP Technical Data Package (TDP).

c. Only those legacy design issues specifically required for the successful Abrams ACCE integration into the M1A2 SEP will be addressed in this Contract. A legacy design issue is defined as a known vehicle System Performance Specification, Prime Item Specification or Product Fabrication Specification noncompliance existing at the time of the execution of this Contract.

d. System performance shall be defined for cruising range, forward acceleration, sustained speeds, and cooling point tractive effort by FORTRAN Simulation Program FO083.ftn, using a new AGT-1500 engine. Reference provisions C.2.7.2.4. and C.4.3.

C.1.1.1 Contract Baselines

C.1.1.1.1 SEP Software Baseline. The baseline software to be used for the required ACCE software modifications shall be SEP 3.5.2.

C.1.1.1.2 SEP Hardware Baseline. The vehicle baseline for the SEP vehicles provided by the Government for the development work shall be ERR 2150 dated 11/3/99, less exceptions, and the Engineering Change Proposals (ECP) listed in EXHIBIT B.

C.1.1.1.3 RESERVED

C.1.1.1.4 RESERVED

C.1.1.1.5 "B" Kit Performance Baseline. The ACCE Engine shall meet the requirements as described in the document Abrams Crusader Common Engine LV100-5 Engine Requirements Document, Contract DAAE07-00-C-N086, Version 4.0, dated 05 June 2001 and subsequent approved changes.

C.1.1.6 Interface Control Documents. The B Kit ICD is LV100-5-001 Revision 02 dated 23 Jan 02 and subsequent approved ICD Change Requests set forth in Exhibit C. The Abrams Adapter Kit ICD is LV100-5-002.

C.1.2 ACCE Program - Contract Master Schedule. The Abrams ACCE program delivery and milestone performance schedules are provided in Attachment 001.

C.1.3 Data Items. All data submitted under this Contract shall be available electronically and in Contractor format, unless otherwise

specified in the CDRL.

C.1.4 Government Furnished Equipment (GFE). The Government will provide the GFE listed on and in accordance with the schedule stated in Attachment 002.

C.1.5 Government Furnished Information (GFI). The Government will provide the GFI as listed on and in accordance with the schedule as stated in Attachment 003.

C.2.0 Program Management.

C.2.1 Program Management. The Contractor shall be responsible for overall engineering program synchronization, which includes the allocation of Contractor provided and Government provided resources to achieve program balance across the configurations. Integrated Product Teams (IPT) and Integrated Product and Process Development (IPPD) will be used, as deemed necessary by a joint decision of the Contractor and the Government, to ensure the full integration of all functional areas in the overall program effort. The IPTs may include subcontractor and Government representatives and/or their appointed contractors. Government IPT members will have access to Contractor developed and implemented program plans, as well as all relevant data developed under this effort. The Contractor's program management efforts shall also include their participation in or the conduct of all necessary reviews to effectively manage the integration effort.

C.2.2 Integrated Data Environment (IDE).

a. The Contractor shall establish, maintain and manage an interactive, online, protected and access controlled IDE, such that the Government can contribute their ideas, comments and suggestions, exchange program information and collaborate in a distributed environment. The IDE shall utilize WINDCHILL web based Collaborative Product Tool, PRO-E, Paperless Engineering Change Process (PECP), Extended Computer Aided Retrieval and Distribution System (ECARDS) and the CMSTAT system. The Government will be provided access to the IDE over a private T-1 line provided by the Contractor.

b. The IDE shall include all data items listed in the Contract Data Requirements List (CDRL) and any presentations from formal review meetings. The IDE shall also include program and financial management information

c. The Contractor shall provide secure access to the IDE by either a Dedicated T1 line or through encrypted telnet sessions using IPLANET encryption via the Internet, depending on the physical location of the user.

C.2.3 Program Cost Control and Management Tools

C.2.3.1 Work Breakdown Structure (WBS) The Contractor shall maintain a Work Breakdown Structure, using MIL-HDBK-881 as a guide. The WBS shall represent the total Contract SOW. The Contractor shall define within the WBS all subcontracted efforts. Contract Change Proposals and Supplemental Agreements shall require the same level of WBS identification, definitions, and SOW relationships as the basic Contract. The Contractor shall use the WBS for planning, managing and reporting program status, and projections for cost, schedule, and technical achievements. No changes can be made at or above the third level of the WBS without Government approval.

C.2.3.2 Earned Value Management System (EVMS). The Contractor shall implement and maintain the Contractor's existing Earned Value Management System for the purpose of generating a monthly Cost Performance Report and Contract Funds Status Report (CFSR). The Earned Value Management Systems shall conform to the criteria set forth in the EVMS ANSI standard (ANSI/EIA-748-1998) for Defense Acquisition. It shall be broken out to the third indenture level of the WBS.

C.2.3.2.1 Performance Measurement Baseline (PMB). The Contractor shall generate a time-phased budget baseline assigning all Contract costs to specific WBS elements. The PMB shall be the basis for the Cost Performance Report (CPR) as required by the Contract value. No budgetary changes shall be made to the PMB within the WBS within Level 1-3 without prior Government notification. The Government reserves the right to disapprove such changes.

C.2.3.2.2 Cost Performance Report (CPR). The Contractor shall prepare and submit a monthly CPR in accordance with DI_MGMT-81466 and CDRL A001. The CPR reporting shall be through the third level of the WBS. Reporting shall be required at lower levels when the Government deems particular items to be problem or high risk areas.

C.2.3.2.3 Contract Funds Status Report (CFSR) The Contractor shall prepare and submit a Contract Funds Status Report (CFSR) IAW the DI-MGMT- 81468 as a guide and CDRL A002.

C.2.4 Program and Technical Meetings.

C.2.4.1 Design Reviews (DR). The Contractor shall conduct two DRs to confirm that the preliminary and final designs logically follows the functional baseline and meets the performance requirements of the vehicles' performance specifications. The DRs shall be held at the Contractors facility. The Government and the Contractor shall reach agreement no later than 90 days before a scheduled DR on the DR entrance and exit criteria.

C.2.4.1.1 Preliminary Design Review. The PDR shall review the preliminary Abrams ACCE design and shall take place on or about 120 days after Contract award. The Contractor shall provide a Rough Order of Magnitude (ROM) for the unit cost to retrofit the "A" Kit into production M1A1 AIM and M1A2 vehicles at the PDR. For this ROM the Contractor shall assume both the production facility installation of the A Kit and field installation of the "A" kit.

C.2.4.1.2 Critical Design Review. The CDR shall review the final Abrams ACCE design and shall take place on or about 300 days after Contract award. The Contractor shall provide an updated ROM for the unit cost to retrofit the A Kit in production M1A2 SEP vehicles at CDR. For this ROM the Contractor shall assume both production facility installation of the A Kit, and field installation of the "A" kit.

C.2.4.1.3 In-Process Reviews (IPRs). The initial IPR shall be conducted approximately 30 days after the Contract award. Follow-on IPRs shall be conducted approximately every 60 days and they shall address cost, schedule, technical progress, and program progress assessments for all engineering and associated ILS activities. No IPR will be held in months where a DR is scheduled. The Contractor shall conduct IPR as an integral part of the Risk Management Plan. These Technical Reviews shall serve as key milestones in the execution of the Systems Engineering Management Plan (i.e. serve as major evaluation/decision points) at which progress and risk are systematically evaluated against established criteria.

C.2.5 Hardware, Software, and Vetronic Systems

C.2.5.1 Hardware Design

C.2.5.1.1 A Kit Design. The Contractor shall develop one A Kit for the M1A2 SEP vehicle. The Contractor shall integrate into the M1A2 SEP vehicle, the Contractor developed A Kit, along with the GFE B Kit and GFE Abrams Adapter Kit. The design goal results in the successful integration of the common engine into the M1A2 Abrams SEP vehicle, without degrading current vehicle performance defined in C.1.1.1.. The Contractor shall develop source data for the M1A2 SEP vehicle, for release of the Abrams ACCE design to the System Technical Support Contract. The Contractor/Government System Technical Support Contract (STS) shall take the source data and develop an ECP for the M1A2 SEP vehicle to incorporate the ACCE into production vehicles. Release of the ECP and incorporation into the tank's TDP shall be performed under the STS Contract. The development of the A Kit will result in changes to the vehicles subsystems. The following is a description of probable changes, though not totally inclusive:

C.2.5.1.2 Frame & Hull.

C.2.5.1.2.1 Structural Changes. The Contractor shall make structural changes to the top deck, hull sidewalls, bulkheads, and hull floors (excluding stiffeners) to eliminate interference and accommodate fitting and mounting of the engine, rerouting of harnesses, hydraulic lines, and cooling lines. The Contractor is not to consider deep water fording for the ACCE vehicles.

C.2.5.1.2.2 Covers/Doors/Grilles. The Contractor shall evaluate access covers /Pre-cleaner doors/Oil cooler doors for availability/access to components and make changes as required. The Contractor shall ensure that the grille doors provide the required airflow for engine operation and reliability.

C.2.5.1.2.3 Mounting Provisions. The integration/design changes for the following items may require the addition of new mounting provisions or changes to the current provisions; fuel lines, AFES, battle override cables, engine control cables including battle override, DECU 100 (FADEC), hydraulic lines, cooling lines, sound suppression, brakes, transmission controls, engine mounting and wiring harnesses.

C.2.5.1.2.4 WTEC III. The Contractor shall monitor and maintain the space allocated for WTEC III.

C.2.5.1.3 Suspension and Steering.

C.2.5.1.3.1 Steering.

C.2.5.1.3.1.1 Reaction Bracket Redesign. The Contractor shall make available the required space claim for the integration of the B Kit and transmission by the repackaging/redesign of steering components. Steering changes included, but are not limited to, the redesign of the reaction bracket and associated cables/linkages/pulleys.

C.2.5.1.3.1.2 Suspension System. The Contractor shall re-index the torsion bars to accommodate change in the vehicle weight and shift in center of gravity.

C.2.5.1.4 Power Package and Drive Train.

C.2.5.1.4.1 B Kit Interfaces. The Contractor shall integrate the B Kit and the Abrams Adapter Kit into the M1A2 SEP vehicles. The Contractor shall design the required interfaces to the engine and transmission, these interfaces include; air, electrical, hydraulic, oil, mounting, and Power Take Offs (PTO). The Contractor shall integrate the engine controller, FADEC. The integration of the FADEC shall only include physical mounting and diagnostics. The Contractor shall periodically (6 months) review and present any progress made

on the DECU 100 (FADEC) prognostics. The Contractor under this Contract shall identify potential areas for prognostics and the associated growth/impact to vehicle software and LRU/SRU configuration required for DECU 100 (FADEC) prognostics future integration. The integration of the DECU 100 (FADEC) prognostics is not required under this Contract. (See C.2.6.1.2 FADEC software integration requirements.)

C.2.5.1.4.2 Transmission. As part of the integration effort the Contractor shall redesign the current configuration transmission (Model No: X1100-3B) for successful integration of the B Kit and Abrams Adapter Kit. The redesigned transmission shall meet the requirements of the transmission Product Fabrication Specification. The transmission Product Fabrication Specification will be delivered to the Government in Contractor format per CDRL A003. The Government shall provide four additional X1100-3B Abrams transmissions in addition to the tranmissions provided with the seven GFM tanks. Reference Attachment 002. The transmission shall undergo a limited 50 hour durability test and trial fit check for risk mitigation and early verification/compatibility. The limited durability test and trial fit will be conducted using an early prototype LV100 engine.

C.2.5.1.4.3 Air Induction System. The Contractor shall redesign the Air Induction system to meet the Engine requirements. The redesign may include, but not be limited to the; air box, pre-cleaner, PJAS, scavenge fan, scavenge fan controls, and seals. The Contractor shall also perform the following scope for Air Box to Engine Seal alternate design, which includes all effort through 3 Nov 03, the date of the PCO stop-work order on LV100 integration effort:

SCOPE FOR AIR BOX TO ENGINE SEAL ALTERNATE DESIGN:

1.0 Objective: The contractor shall develop six, and shall select three optional design concepts for an improved Air Box to engine seal to replace LV100 Inlet Plenum Seal part no. 4179T26P01.

1.1 Design Criteria

a. The seal shall provide a self-sealing interface as the powerpack is placed into the vehicle similar to that used in the Abrams with the AGT 1500 engine. The V-Band clamp, or equivalent manually actuated clamping devices, shall be eliminated.

b. Allocated air induction system pressure drop shall not exceed 27.3 inches of water at the engine inlet.

c. The seal shall accommodate relative movement between the air box and engine as defined in ICD LV-100-ICDC-0031R1.

d. Vehicle deep water fording capabilities shall not be degraded.

e. Changes to the vehicle/engine B-Kit interface may be required.

2.0 Concept Selection

2.1 An engineering evaluation shall be performed as required to enable selection of the three best seal concept alternatives. All of the following options shall be considered, and reasons for elimination shall be recorded. Other variations with significant potential that may be identified during the evaluation process shall also be evaluated. The potential for NBC tube routing improvements shall be considered and shall be coordinated with GE/Honeywell during the evaluation.

a. Current air box "as is" without modifications

Air inlet adapter - change / DCI transition duct - no change

b. Current AGT 1500 seal without modification

Air inlet adapter - change / DCI transition duct - change

c. Current AGT 1500 seal face sealing concept with seal modification.

Air inlet adapter - change / DCI transition duct - change

d. Current AGT 1500 seal face sealing concept with seal surface perpendicular to the motion of the engine

Air inlet adapter - change / DCI transition duct - change

e. Current AGT 1500 seal face sealing concept with the seal surface located on angle similar to current Honeywell installation.

Air inlet adapter - change / DCI transition duct - change

2.2. A baseline CFD analysis shall be performed to establish pressure drops provided by the current design.

2.2.1 Three of the leading, or most viable, candidates shall be selected from the above list using the results of the informal trade study.

2.2.2 Pro-E models of the leading concepts shall be created.

2.2.3 Maintainability, Logistics, HFE, and producibility evaluations of the selected concepts shall be conducted.

3.0 Technical Data: Detail drawings are not included in this scope.

C.2.5.1.4.4 Exhaust System. The Contractor shall work with the GFE B Kit Contractor, on configuration and integration of the redesign exhaust system. The redesigned exhaust system shall be provided to the Contractor as part of the GFE Abrams Adapter Kit. The Contractor shall redesign the exhaust-to-grille door seal, if required.

C.2.5.1.4.5 Cooling Systems. The Contractor shall perform analysis and redesign of the cooling systems to provide adequate cooling for the engine and transmission. The redesign may include, but not be limited to; engine heat exchanger, transmission heat exchanger, hydraulic fluid heat exchanger, engine oil cooling lines, and generator cooling lines.

C.2.5.1.4.6 Fuel Systems. The Contractor shall redesign the fuel system as required for integration of the B Kit and transmission. The redesign may include, but not limited to; resizing of the left-engine-fuel cell, quick disconnect, and rerouting of the fuel lines. The Contractor shall redesign the Smoke Generator System to accommodate the B Kit.

C.2.5.1.4.7 Braking System. The Contractor shall redesign the braking system as required. The redesign may include, but not limited to; resizing, rerouting and repackaging of the brake cables and pulleys due to redesign of reaction bracket.

C.2.5.1.4.8 Mounting Systems. The Contractor shall redesign the engine guide and engine mount/shock isolation system to accommodate the B Kit revised space claim and mounting requirement Per the Abrams Adapter Kit, if required.

C.2.5.1.4.8.1 Snubber Analysis/Test Effort. In coordination with any mounting system redesign effort required under C.2.5.1.3.8, the Contractor shall perform the following "Snubber" space claim analysis and test support effort to assist in determining whether an M1A2 vehicle with an LV100 (ACCE) engine will need an engine support (Snubber) to preclude any rotor vane hard rubs against the stator. The Contractor is not required to design the Snubber itself.

C.2.5.1.4.8.1.1 The Contractor shall submit recommended modifications to the proposed Snubber space claim that was reviewed by the Contractor on 12 June 2002. Provide necessary reviews to establish an approved Snubber P3I space claim.

C.2.5.1.4.8.1.2 Review and comment on system impacts of any Snubber design proposed for incorporation.

C.2.5.1.4.8.1.3 In accordance with paragraph C.4.5.2, provide Contractor support of Government shock and vibration testing of a prototype M1A2 tank with a LV100 engine at APG. Also, provide support to the Government in writing and reviewing the final shock and vibration test plan/report, incorporating lessons learned based on review of previous test plans/reports.

C.2.5.1.4.9 Controls Systems. The Contractor shall redesign the control systems as required. The redesign may include, but not limited to the shift select assembly and battle override.

C.2.5.1.5 Auxiliary Automotive.

C.2.5.1.5.1 Power Management System. The Contractor shall redesign as required elements of the power management system. These elements may include, but are not limited to, harnesses, Hull Remote Switching Module (HRSM), and Hull Quick Disconnect Panel.

C.2.5.1.5.2 Harnesses. Engine harnesses on the Engine side of the hull quick disconnect box will be supplied as part of the GFE Abrams Adapter Kit except for the following harnesses/cables: alternator cable to regulator (harness) 3W103, alternator negative power (cable) 3W102-1, alternator positive power (cable) 3W102-2, starter negative power (cable) 3W101-1, starter positive power (cable) 3W101-2, pilot relay negative (cable) 3W108, pilot relay positive (cable) 3W109. The Contractor shall redesign harnesses on the vehicle A Kit side of the Hull Quick Disconnect Panel as required for successful integration

C.2.5.1.5.3 Hull Remote Switching Module (HRSM). The Contractor shall reconfigure the existing HRSM(s) as required to meet the power requirements of the engine/transmission and their controllers.

C.2.5.1.5.4 Hull Quick Disconnect Panel. The Contractor shall redesign the hull quick disconnect panel to handle the additional circuitry.

C.2.5.1.5.5 RESERVED

C.2.5.1.5.6 Hydraulic System. The Contractor shall redesign the hydraulic system as required for the engine integration. The redesign may include, but not be limited to, resizing and rerouting of new and existing hydraulic lines and hoses, redesign of hydraulic reservoir & support, integration of the following new configuration items; hydraulic pump, filter manifold, flow control valve, quick disconnects, and temperature transducer. The Contractor shall not implement a hydraulic drive for the ACCE Scavenge fan.

C.2.5.1.5.7 Automatic Fire Extinguishing System (AFES). The Contractor shall redesign the AFES to accommodate the changes in the engine compartment. The Contractor shall integrate the intent of GDLT8891, Dry Chemical System, into the M1A2 SEP vehicle. The Contractor shall relocate optical sensors/detectors/dispersion tubes to provide optimum protection for the new items.

C.2.5.1.5.8 Sound Suppression Systems. The Contractor shall redesign/modify the Sound Suppression System to accommodate changes to the engine bulkhead.

C.2.5.1.6 Turret Assembly. At this time there are no known changes to the turret assembly.

C.2.5.1.7 Fire Control. The Contractor shall perform required analysis and testing to validate that the current Fire Control System performance has not been degraded by the integration and/or performance of the A Kit, B Kit or Abrams Adapter Kit

C.2.5.1.8 Nuclear, Biological & Chemical. The Contractor shall perform the required analysis and testing to validate that the NBC Bleed Air system performance has not been degraded by the integration and/or performance of the B Kit, A Kit or the Abrams Adapter Kit.

C.2.5.1.9 Special Equipment. At this time there is no requirement for special equipment.

C.2.6 Software and Vetronic Systems.

C.2.6.1 Software Development.

C.2.6.1.1 The Contractor shall modify the baseline software and develop the necessary software to integrate the "A" Kit, "B" Kit, and Abrams Adapter Kit. The Contractor shall develop this software and practice Software Quality Assurance in accordance with its written division software development standards and procedures. The Contractor may use commercial software with written COTR approval. All wholly Government funded software developed under this Contract shall be delivered with unlimited rights.

C.2.6.1.2 DECU 100 (FADEC) Software. The Contractor shall integrate up to four drops (Versions 3.9, 4.0, 5.0 and 6.0) of Government-furnished DECU 100 (FADEC) software into the M1A2 SEP/LV100 software. The most recent DECU 100 (FADEC) software should be included in the Contractor's SIL and the Contractor Engineering and ILS facility vehicles. The Contractor shall facilitate the inclusion of the most recent DECU 100 (FADEC) software, that has undergone SIL validation and is safety certified, into vehicles undergoing testing at APG and YPG. The contractor's integration and the Government-furnished DECU 100 (FADEC) software shall comply with the requirements of DECU 100 (FADEC) Interface Control Document ICD-LV100-5-004 Revision 00 dated May 31, 2002.

C.2.6.2 Software Integration. Upon final release of the ACCE software to the field for Government testing the Contractor shall ensure that the current software is compatible with the fielded system software versions.

C.2.6.3 Software Licenses. The Contractor shall advise the Government of the necessary software licenses and agreement required for development and fielding of non-GFE software for the integration of the A-kit, B-kit and Abrams Adapter Kit.

C.2.6.4 Software Government Audits. The Government will conduct several working level software reviews at the Contractors facility throughout the design phase. These reviews may include, but not be limited to, documentation, process and product audits, metrics analysis, and spot observation of CSU thru System Level.

C.2.6.5 Software Documentation. The Contractor shall modify by providing change pages for the following SEP software documentation and deliver in accordance with the CDRLs A004-A012.

1.) Software Requirements Specifications (SRS) (CDRL A004)
2.) System/Segment Design Document (S/SSD) (CDRL A005)
3.) Interface Requirements Specification (IRS) (CDRL A006)
4.) Software Design Document (SDD) / Interface Design Document (IDD) (CDRL A007)
5.) Software Product Specification (SPS) (CDRL A008)
6.) Version Description Document (VDD) (CDRL A009)
7.) 1553 Bus Interface Control Document (ICD) and data package description. (CDRL A010)
8.) RS485 Utility Interface Control Document and Bus Packet description. (CDRL A011)
9.) DELETED by Modification P00001

C.2.6.6 Software Meetings. The Contractor, at the Contractors facility, shall hold the following software meetings.

C.2.6.6.1 Software Specification Review (SSR). Concurrently with the Preliminary Design Review (PDR), the Contractor shall address, as

a minimum, evaluation of design adequacy, allocation of functionality, requirements, testability, risk, and schedule.

C.2.6.6.2 Software Design Review 1. Concurrently with the Critical Design Review (CDR), the Contractor shall address, as a minimum, evaluation of design progress, consistency, technical adequacy, and test approach; compatibility between requirements and preliminary design; and operations and support concepts.

C.2.6.6.3 Software Design Review 2. The Contract shall address, as a minimum, evaluation of detailed design, including databases and interfaces; assignment of CSCI requirements to lower level software components; design reliability; maintainability; testability, and supporting documents.

C.2.6.7 Software Tools and Processes

C.2.6.7.1 Software Development Plan. The Contractor shall develop the software in accordance with the SEP Software Development Plan as modified by the Abrams ACCE program (SDP).

C.2.6.7.2 Software Metrics. The Contractor shall use software management metrics thru out the software development cycle. The metrics to be shall be identified in the SEP SDP.

C.2.6.7.3 Software Quality Assurance. The Contractor shall practice Product Assurance and conduct incremental system level testing of three (3) software build drops consisiting of two software builds and a full regression test of the third (cleanup drop) software drop. All testing will be completed prior to the safety release of the software.

C.2.6.7.4 Software Configuration Management. The Contractor shall document and maintain software configuration items in accordance with their established practices to ensure complete identification, status accounting, control, and audits. The Contractor shall assign unique identifiers to the Abrams ACCE software to include documentation.

C.2.7 Systems Engineering

C.2.7.1 System Definition

C.2.7.1.1 Requirements/Functional Analysis

C.2.7.1.1.1 Specifications. The Contractor shall prepare Program Unique performance specifications for Abrams ACCE Configuration Items (CIs) and Line Replaceable Units (LRUs).

C.2.7.1.1.2 Requirements/Functional Analysis. The Contractor shall conduct Requirements/Functional Analysis to define the system functions and the performance requirements specifying how well the functions must be performed. This effort shall result in minimum essential data as follows: Functional Flow Block Diagrams depicting the functional decomposition, Performance Specification containing the performance requirements, a revised System Specification, revised specifications (existing) at the LRU level and new specifications, if required for new components (LRUs). All requirements were baselined at the System Design Review and shall be configuration controlled under this Contract thereafter.

C.2.7.1.2 System Architecture Definition. The Contractor shall define the system architecture depicting the proposed system configuration for implementing the functional decomposition. This effort shall result in minimum essential System Block Diagrams depicting the architectural elements and the interfaces among them.

C.2.7.1.3 Interface Definition and Management. After delivery of the first ACCE "B" Kit and Abrams Adapter Kit, the Contractor shall assume responsibility for the ACCE B-Kit and Abrams Adapter Kit Interface Control Documents (ICDs), and for the documentation and control of B-Kit to Abrams Vehicle, Adapter Kit to Abrams Vehicle, and B-Kit to Abrams Adapter Kit interfaces. Interface control shall be provided to ensure compatibility and interoperability of hardware and software components IAW the M1A2 SEP vehicle system specification.

C.2.7.1.4 System Modeling and Simulation
C.2.7.1.4.1 Trade Studies. The Contractor shall conduct required design and performance analyses, trade studies, and requirements traceability to demonstrate that the Abrams ACCE integration design effort results in a design that meets the pertinent requirement of each vehicle's System Performance Specification.

C.2.7.1.5 Weight and Mass Properties Management

C.2.7.1.5.1 Product Drawings. The Contractor shall revise, or prepare new in Contractor format, Interface Control Drawings (ICDs), Layouts, Installations, Interconnects, Systems, Assemblies, and Component drawings as required for the successful design, prototype build, transportability, and procurement of the Abrams ACCE. The Contractor shall revise the M1A2 Characteristics and Descriptions Book. The contractor shall receive all General Electric/Honeywell LV100 drawings and incorporate them into the Abrams TDP as vendor part numbers. No conversion to Military Standard format is necessary.

C.2.7.1.6 System Integration and Prototyping

C.2.7.1.6.1 SIL and Engineering Lab. The Contractor shall design, build, modify, procure, and receive GFE components indicated in Attachment 002 for a SEP Full Syst. Bench, components required to transform the Contractors current M1A2 SEP SILs and engineering labs into SILs/Labs that can accommodate both the SEP and Abrams ACCE configurations. This effort requires the Contractor to build one (1) new SIL dedicated to the Abrams ACCE M1A2 SEP configuration. The Contractor shall procure, and receive as GFE, components required to build an ACCE SIL to facilitate the software process. The Contractor shall procure, or receive as GFE, spare components necessary to maintain the SIL in a state of readiness. The Contractor will use commercial parts where available.

C.2.7.1.6.2 Vehicle Prototype/Pilot Build. The Contractor shall procure hardware and materials, and receive GFE components indicated in Attachment 002, necessary to modify and maintain seven (7) GFE M1A2 SEP tanks with the Abrams ACCE A-Kit, GFE Abrams Adapter Kit, and the GFE B-Kit. The modification of the seven tanks shall take place at the Contractors facility except as noted in paragraph C.2.7.1.6.2.1. The Government shall deliver the seven tanks to the Contractor in no less than 10/20 Standards. The Contractor shall conduct annual and semi-annual maintenance of the seven GFE tanks while they are at the Contractors facility. The seven tanks shall be modified and delivered to the Government in the Abrams ACCE configuration in accordance with the schedule, Section F.

C.2.7.1.6.2.1 Engine Replacements. Two replacements of installed LV100 engines shall be performed by the contractor. The low power engine initially furnished for use in the Automotive Test Rig tank shall be replaced by a non-compliant engine with increased horsepower at the contractors facility. This non-compliant engine shall subsequently be replaced by a compliant engine after completion of the ATR test.

C.2.7.1.6.3 M1A1 AIM Refurbishment and Shipment. The Contractor shall return the two GFM M1A1 AIM tanks that were previously furnished by the Government under this Contract, in the same condition as when received. Both vehicles shall be returned to the Government by transferring their accountability to STS contract DAAE07-01-C-N075. The one M1A1 tank that was partially disassembled by the contractor prior to the 12 Oct 01 stop-work notice shall be reassembled and refurbished as necessary under the STS contract to return it to the same condition that it was in when received.

C.2.7.1.6.4 Additional Effort on GFE M1A2 SEP Tanks. The Contractor shall perform the following effort on GFE M1A2 SEP tanks that were previously furnished by the Government under this Contract and that had been modified to the Abrams ACCE (LV100 engine) configuration in accordance with paragraph C.2.7.1.6.2 at the time of the 3 Nov 03 stop-work order on LV100 engine integration effort:

SCOPE FOR FLIR REMOVAL AND SHIPMENT:

Affected Vehicles Serial Numbers:
19070 (Engineering Facility Tank)
19117 (ILS Facility Tank)
19004 (YPG RAM Tank)
19072 (YPG Performance Tank)
21066 (APG RAM Tank)
21069 (YPG RAM Tank)

1. The following items are to be removed from the above 6 (of 7), M1A2 SEP Tanks furnished by the Government under LV100 Contract DAAE07-01-C-N087:

Second Generation FLIR Thermal Receiver Unit, PN 12987790-1
Second Generation FLIR Biocular Image Control Unit, PN 12987770-1
Second Generation FLIR CITV Sight Assembly, PN 12987753-1

2. The contractor shall prepare each of the items using the best commercial practices for safe shipping.

a. Ship CITV Sight Assemblies to:

Raytheon Network Centric Systems
2501 W. University Dr.
McKinney, TX 75070

Mark for: Sandra Kemp, 972-952-4566

b. Ship TRUs and BICUs to:

DRS Sensors & Targeting Systems, Inc.
3500 Torrance Blvd.
Torrance, CA 90503

Mark for: HTI Block-1 Program

Phone 310-750-3200, Rementer x3251 / Larsen x3210

3. The contractor shall preserve and store any hardware removed to access the shipped items, adequately preserve the tanks, and provide a robust cover over the FLIR area to provide protection during tank operations. A robust cover shall also be provided for vehicle S/N 19006 (APG Performance Tank) to cover the area where the FLIR was previously removed by the Government.

4. Transfer all FLIR GFE items to Contract - DAAB07-02-C-J204 (Modification for Block 1- P00020) USG POC - Joseph Manganaro Phone - (732)-427-1389

C.2.7.2 Technical Planning and Control

C.2.7.2.1 Systems Engineering Management Plan (SEMP). The Contractor shall maintain the Abrams ACCE System Engineering Management Plan implemented under STS Contract DAAE07-96-C-X196 or its successor Contract. This SEMP shall provide the detailed technical integration steps required to meet the System Performance Specifications. The plan shall contain a system configuration matrix diagram that identifies the top level system and associated subsystems. The plan shall include schedules, management approaches, risks, interface management, testing, and logistics support concepts for the Abrams ACCE integration design effort.

C.2.7.2.2 Risk Management As part of the Systems Engineering Management Plan (SEMP), the Contractor shall establish mechanisms to assess, quantify, and mitigate the cost, schedule and technical risks inherent in the program. As a minimum, these mechanisms shall include Technical Performance Measures (TPM) and Technical Reviews. During the execution of the SEMP, the Contractor shall use these mechanisms to periodically monitor and assess progress in adequately mitigating the risks. The Contractor shall identify any moderate or high risks and prepare a time phased risk mitigation and tracking plan.

C.2.7.2.3 Technical Performance Measures. The Contractor shall establish appropriate Technical Performance Measures (TPM) as a means for tracking, monitoring, and assessing technical risks on a periodic basis. The TPMs shall be an integral part of the Risk Management Plan and shall be identified with specific WBS elements. The Contractor shall use the TPMs to report and proactively manage the risks inherent in the program. TPMs shall be developed for a maximum of three (3) engine configurations furnished by the Government for use in the prototype tanks.

C.2.7.2.4 Verification and Validation. As part of the Systems Engineering Management Plan (SEMP), the Contractor shall establish appropriate means for validating system requirements to ensure that all requirements are correct, complete and ultimately traceable to the customer need. All requirements shall be validated prior to progressing beyond the System Requirement Review (SRR). Furthermore, the Contractor shall establish appropriate means of verifying that the system under development will in fact satisfy all requirements. A Verification Plan shall be established to identify how each requirement is to be verified (Analysis, Demonstration, Test, and/or Inspection) and the success criteria for concluding whether each requirement has been satisfied. To minimize risk, the Verification Plan shall be designed to be executed incrementally so as to verify requirements as early in the program (i.e. PDR or CDR timeframe) as possible through analysis or simulation while other requirements may not be verified until later when testing of a physical system is completed. A Functional Configuration Audit (FCA) shall be conducted to confirm that all requirements have been satisfied.

C.2.7.3 Configuration Management

C.2.7.3.1 Configuration Items (CI) and Identification. The Contractor shall document and maintain configuration items in accordance with their established practices to ensure complete identification, status accounting, control, and audits. The Contractor shall assign unique identifiers to the Abrams ACCE CIs and their configuration documentation.

C.2.7.3.2 Off-The-Shelf (OTS) Documentation. When a CI is wholly developed with private funding and modified to satisfy Government requirements, the Contractor shall re-identify the CI as a Government modified CI, and document and control the CI IAW the Government-approved Configuration Management Plan (CMP). The Contractor shall identify OTS items selected for use without alteration on vendor item drawings. The Contractor shall identify OTS items that are altered for application on altered item drawings. The Contractor shall reference manufacturers specifications, manuals, and associated supplemental data on the vendor/altered item drawings. Vendor item drawings and altered item drawings are defined in ASME Y14.24M. Items procured with credit cards must be included and require drawings IAW above statements.

C.2.7.3.4 Configuration Control/Design Reviews. The Contractor shall accomplish the configuration management tasks below during this Contract period for the configuration identification, documentation, control, status accounting and audit of the product baseline for the Abrams ACCE configuration in this design integration effort. The Contractor shall place, under configuration control, the full spectrum of system specifications, software documentation, and engineering drawings that will represent the Abrams ACCE configuration that meets the requirements of the M1A2 SEP vehicle System Performance Specification. The Contractor shall maintain a configuration control program IAW the approved CMP. Following ECP release changes to the product baseline(s) will require approval by the Government.

C.2.7.3.5 Configuration Management Plan (CMP). The Contractor shall implement configuration management of the system IAW the Contractor's established CMP. The Contractors CMP shall include configuration identification, control, status accounting (for hardware, software, and documentation), and audits.

C.2.7.3.6 Configuration Maintenance. Engineering establishes and maintains control of the engineering hardware documentation prior to the release of ECP. After release of the ECP, Configuration Management will control change to the Configuration Baseline identification drawings, specification and associated documentation. Documentation is revised and released to using organizations through the Configuration Manage System.

C.2.7.3.7 Engineering Change Proposal (ECP). The Contractor shall document, test, and write ECP Source Data. The release of the designs to the Government for approval shall be accomplished under the STS Contract.

C.2.7.4 Specialty Engineering

C.2.7.4.1 Producibilty, Production Planning, and Development. The Contractor shall plan for producibilty of the Abrams ACCE configured vehicles. The Contractor shall consider both the production of the individual hardware items and the related Manufacturing/Quality issues and concerns. The Contractor shall also focus on the efforts required to successfully manage the transition to future production of hardware items. Producibilty consideration for "A" Kit and Test, Field Retrofit, and production line incorporation including ground hop capability shall be addressed by the Contractor.

C.2.7.4.1.1 The Contractor shall plan for pre-production activities for X1100-6 ACCE Transmission. The purpose of this effort during the integration design effort is to ensure the smooth and timely transition from the design effort to the production of the X1100-6 ACCE transmission.

C.2.7.4.1.2 The Contractor shall provide Pre-production Planning for the X1100-6 ACCE Transmission and the associated major subcontractor ACCE integration related activity for the Abrams M1A2 SEP ACCE Tank. The pre-production planning shall include the following elements and pertain to CY 2002 and CY 2003 only as further pre-production activities shall take place under a future production contract:

Material - The Contractor shall develop, provide and maintain a manufacturing Bill of Material (BOM), identify long lead and critical material requirements, perform material make / buy analyses and perform vendor surveys for buy items.

C.2.7.4.2 Concurrent Engineering. Thru out the design phase the Contractor shall make use of concurrent engineering/ Design For Manufacturing (DFM) processes involving all engineering disciplines with the goal of successful cost efficient integration of the ACCE by mitigating manufacturing process risk, and to ensure that design characteristics are compatible with economic production methods. The DFM process shall demonstrate that the product design is compatible with planned manufacturing processes. (i.e. Logistics, Manufacturing, Vetronics, Mechanical, Electrical, Program, HFE, Quality, Material Engineering, Safety, etc)

C.2.7.4.3. Life Cycle Sustainment (LCS) and Obsolescence. The Contractor shall conduct life cycle Sustainment analysis on all Abrams A Kit equipment. The Contractor shall identify potential obsolescence issues that will jeopardize the Abrams A-Kit continued supportability throughout the life cycle. The LCS analysis shall consider, obsolescence elimination initiatives, weapon system concurrency issues for TADSS, and define recommended remedies/courses of action in an overall effort to reduce total life cycle cost and to ensure continued sustainability, reliability, maintainability, and operability.

C.2.7.4.4 Reliability and Maintainability Design Analysis. The Contractor shall conduct and manage a RAM-D program with a goal of insuring that the integration efforts do not degrade current Abrams demonstrated RAM-D performance. As a minimum, the Contractor shall ensure that the integration efforts do not cause the vehicle system to fall below the System Specification Requirements for vehicle System Reliability, Combat Mission Reliability, Tank Durability, and Powertrain Durability, as identified in document SA-SA00001C dated 31 July 1998, subject to current performance waivers, deviations, and letters of system non-conformances.

C.2.7.4.5 For purposes of determining compliance with paragraph C.2.7.4.3 the GFE "B" Kit combined with the GFE Abrams Adapter Kit is assigned the following values:

Engine Durability	1600 MTBF
Engine Mission Reliability	400 MTBF
Engine System Reliability	250 MTBF
Engine Unscheduled Maintenance action	100 MTBF

C.2.7.4.6 As Part of the RAM-D Integration program the Contractor shall provide the following support:

a. Update the Failure Definition/Scoring Criteria with an Addendum for M1A2 SEP to reflect Abrams Integration design changes, failures modes and severity per using Work Directive GJ013C1001 S4 of the Systems Technical Support (STS) Contract DAAE07-96-C-X195 and future STS contracts.

b. Maintain a database (FRACAS) which will include all Abrams Integration related RAM-D/T Incident Reports (IR) and corrective action information

c. Support Four (4) Abrams Integration Scoring Conferences, One (1) Assessment Conference and One (1) Closeout Corrective Conference

d. Support test planning activities including test plan reviews and Test and Evaluation (T&E) IPT's.

e. Prepare a list of 50 ACCE unique candidates (to be coordinated with the Government) and conduct FMECA on these line items for predominant failure modes to support LSAR efforts.

C.2.7.4.7 The Government shall provide the data for relevant GFE hardware to be used in the development of reliability and maintainability predictions in a concurrent engineering effort.

C.2.7.4.8 Abrams NBCCS. The Contractor shall provide NBCCS design guidance and engineering support relative to maximizing NBCCS survivability of the Abrams Common Engine. The Contractor shall conduct a survivability/vulnerability analysis of the Abrams Common Engine based on Chemical Agent Threat profiles or other mutually agreed to threat profiles provided as GFI and provide a NBCCS Vulnerability Assessment report in accordance with CDRL A013. The assessment/analysis will focus on NBC hardening of engine components/oil exposed to chemical agent/decontaminant vapor threats and pyrolytic decomposition by-products introduced into the engine through the ingestion of contaminated air. As a part of the analysis, the Contractor will provide NBCCS design guidance to upgrade materials that may be identified as vulnerable and/or unacceptable. The assessment report will identify if simulant/live agent testing on specified engine components and oil is recommended/required.

C.2.7.5 Product Acceptance and Quality

C.2.7.5.1 Product Acceptance. The Contractor shall implement and maintain a product acceptance system (IAW GD 2000) to ensure engineering Hardware/Software (HW/SW) and technical documentation (T.D.) compliance with the deliverables performance specification requirements prior to offering that product to the Government for acceptance. The Contractor shall ensure that all Engineering HW/SW and technical documentation, including purchased products, conform to the performance specifications.

C.2.7.5.2 Quality Engineering. Quality Engineering shall be an integral participant thru out the engineering process. The Contractor shall perform continuous Quality Engineering analysis of drawings, specifications, and related data to determine the type and amount of inspection and test requirements necessary to assure that the design and performance requirements are met. The Contractor shall develop Inspection Methods and Test Equipment for use during the assembly and installation of production systems. The Contractor shall ensure that the specifications and/or drawings modified or new contain sufficient functional, dimensional, material, and protective finish requirements necessary to meet the requirements set forth in the Product Fabrication Specifications.

C.2.7.5.3 Quality Assurance Requirements (QAR). The Contractor shall create QARs using DRSTA-P-702-101 as a guideline as well as agreements in place with PM Abrams Quality, for all new drawings that require them as determined by the Contractors Quality Engineering department.

C.2.7.6 Safety Engineering and Health Hazards.

C.2.7.6.1 Safety Engineering. The Contractor shall develop and implement a safety program for the Abrams ACCE configuration under this Contract. System Safety activities will be integrated with the concurrent engineering process used to develop, mature, and support the system. The Contractor shall establish a Safety Hazard Tracking System using the existing Abrams Hazard Tracking System. The resolution of these hazards will determine whether safety engineering objectives are met. As a minimum, the Contractor shall:

a. Identify hazards associated with the system by conducting safety analyses and hazard evaluations. Analysis shall include both operational and maintenance aspects of the Abrams ACCE integration effort.

b. Eliminate or reduce hazards by appropriate design or materiel selection. If hazards to personnel are not avoidable or eliminated, take steps to control or minimize those hazards.

c. System Safety issues will be addressed at each design review, including a report by System Safety Engineering on the status of the Safety Hazard Tracking System.

C.2.7.6.2 Safety Assessment Report (SAR). The Contractor shall prepare an A Kit and GFE Abrams Adapter Kit Safety Assessment Report using DI-SAFT 80102B as a guide under CDRL A014. The SAR shall identify all safety features and inherent hazards, and shall establish special procedures and/or precautions to be observed by test agencies and system users. As an appendix to the Safety Assessment Report, the Contractor shall identify Health Hazards associated with the system. The Contractor shall provide a description and discussion of each potential or actual health hazards of concern for each subsystem or component. The following are examples of some areas of concern that may contain SAR. This is not an all-inclusive list:

a. Automotive issues (i.e., stability, braking, handling)
b. Fire protection issues
c. Toxic fumes (i.e., engine exhaust, weapons firing)
d. Noise levels (i.e., steady-state, drive-by, impulse).
e. Electrical issues
f. Hot and cold surfaces.
g. Toxic materials

h. Pinch/entrapment points

C.2.7.6.3 Radioactive Materials. The Contractor shall not use any radioactive materials without the approval of the Government. If any items furnished under this Contract will contain Thorium, or other source material (see Title 10, Code of Federal Regulations, Part 40) in excess of 0.05 percent by weight or any other intentionally added radioactive material, the Contractor shall provide a list to the Government for approval, IAW CDRL A015. If a Nuclear Regulatory Commission (NRC) license is required, the Contractor shall submit a request for a license within 30 days of Contract award.

C.2.7.6.4 Health Hazards. The Contractor shall identify potential health hazards that are indigenous to and generated by the Abrams ACCE and eliminate or reduce such health hazards to an acceptable level as determined by the Government. Health Hazards shall be reported as a part of the SAR.

C.2.7.6.5 Hazardous Materials. The Contractor shall not use cadmium, hexavalent chromium or other highly toxic or carcinogenic materials in the Abrams ACCE integration development without Government approval. The Contractor shall not use materials that are identified in the Registry of Toxic Effects of Chemical Substances, published by the National Institute for Occupational Safety and Health, as materials that will produce toxic effects via the respiratory tract, eye, skin or mouth. Moderately toxic materials may be used provided the design and control preclude personnel from being exposed to environments in excess of that specified in 29 CFR 1910, Occupational Safety and Health Standards.

C.3.0 Logistic

C.3.1 Integrated Logistics Support (ILS). The IPT shall develop and manage an ILS program for the Abrams ACCE configuration during the development phase using source data, provided jointly from other Contractors and the Government.

C.3.2 NET Development. The Contractor shall develop applicable Operator/Maintainer Training materials and conduct Operator/Maintainer Training prior to the start of Government testing

C.3.2.1 ACCE OPERATOR/OPERATOR MAINTENANCE/PMCS TRAINING. The Contractor will develop lesson plans in a format to be provided by the Government in CDRL A016 that will support both the Armor School and New Equipment Training. The Contractor should use the lesson plans in that format from the previous training plans. The general theory of operation will be included into the lesson plans. Four (4) copies of the lesson plans, to include all drawings and pictures, will be provided in digital form to the Abrams Net Manager IAW CDRL A016. A training IPR will be conducted sixty (60) days prior to the IKPT to review all training material. All lesson plans will be updated after the IKPT to reflect the latest changes and a final copy submitted in accordance with the CDRL A017. The Operator Training shall be conducted in two (2) iterations of 24 hours per class for six (6) students. Training will be conducted at the Contractor's facility.

C.3.2.2 ACCE UNIT MAINTENANCE TRAINING and Direct/General Support Maintenance Training (if required). The Contractor shall conduct two separate classes consisting of Unit Maintenance Training and Direct/General Support Maintenance Training to include a full theory of operation, disassembly, repair, assembly pack splitting and reassemble, component removal and adjustment, and troubleshooting. The Contractor will develop lesson plans in a format provided by the Government (CDRL A017) that will support both the Ordnance Schools and New Equipment Training. The Contractor will provide to the Abrams Net Manager, in digital format, four (4) copies of the lesson plans to include all pictures and drawings for both Unit Maintenance and Direct General Support Maintenance under CDRL A017. A training IPR will be conducted sixty (60) days prior to the IKPT to review all training material. All lesson plans will be updated after the test to reflect the latest changes and the Contractor shall submit a final digital copy to the Abrams Net Manager in accordance with the CDRL A017. The Unit Maintenance Training shall be conducted in two (2) iterations of 40 hours per class for six (6) students. The Direct/General Support Maintenance Training, if required shall be conducted in two (2) iterations of 80 hours per class for six (6) students. Training will be conducted at the Contractor's facility.

C.3.3 Maintenance Support

C.3.3.1 Technical Publications

C.3.3.1.1 Technical Data. The Contractor shall update by page substitution, existing vehicle paper manuals to reflect the Abrams M1A2 SEP modifications for the LV100 engine in accordance with the Contractors established technical manual update procedure.

C.3.3.1.2 RESERVED

C.3.3.2 Validation & Verification (VAL/VER) The Contractor shall validate technical data and conduct a one (1) month Logistics Demonstration.

C.3.3.3 Packaging/Handling & Transportation. The Contractor shall develop and/or update appropriate packaging data for spare and repair parts. Packaging data shall be developed for A Kit and the GFE Abrams Adapter Kit which will provide adequate protection for short-term shipment and transportation.

C.3.3.4 Provisioning

C.3.3.4.1 Parts Master File Provisioning. The Contractor shall establish and maintain a Parts Master File (PMR) (LSA-36) for the M1A2 SEP ACCE Vehicle configuration (Usable On Code for the configuration). The file shall reflect the vehicle contract baseline, including engineering design changes, historical data and changes to specific data fields as directed by the Government. The Contractor shall provide drawings IAW the CDRL A018, and shall submit data on all "P" coded parts to be provisioned that do not currently have a national Stock Number (NSN). The Contractor's data base shall be updated approximately every 60 days by comparing it with the Government supplied data files of the PMR on a mutually agreed upon schedule. The Contractor shall review the Government supplied data and submit comments not later than 30 days after receipt of the data.

C.3.4.4.2 Pre-Procurement Screening. The Contractor shall conduct pre-procurement Defense Logistics Information Service DLIS screening using LOGRUN and CD-FICHE for standardization of all commercial items selected as repair parts. This screening will be used to select valid part numbers for input into the PMR.

C.3.5 Diagnostic Engineering. The Contractor shall develop troubleshooting data to be incorporated into the paper and electronics technical manuals.

C.3.6 ILS Engineering

C.3.6.1 Supportability Analysis. The Contractor shall perform a Supportability Analysis (SA) of the Abrams ACCE IAW the Army's two level maintenance concept (Tactical and Sustainment). The Contractor shall conduct analysis to define optimal support concept planning. The Contractor shall define all tasks required to operate, maintain, and support the vehicle systems to the lowest field replaceable assembly. Performance of the required Supportability Analysis tasks shall be tailored to meet the vehicle systems requirements and integrated within the system engineering process. Interface and connectivity of the supportability data to any GFE/existing platform support structure shall be the responsibility of the Contractor.

C.3.6.2 Task Analysis. The Contractor shall perform detailed task analysis defining all tasks required to operate, maintain, and support the Abrams ACCE and the vehicle system but only to the extent the vehicle system is impacted by the Abrams ACCE integration. The task analysis shall identify all logistic support resources (i.e., manpower, force structure, facilities, support equipment, test program sets, training, initial parts allocations and spares, etc.) required to perform each task. The Contractor shall conduct a Level of Repair Analysis (LORA) using a Government approved model for predicting and analyzing support scenarios. The Contractor shall ensure standardization in support of design or design change. The Contractor shall also perform a maintainability /supportability comparative analysis and Logistics Demo on unique items on one M1A2 SEP vehicle. The Contractor shall evaluate the design or design changes for support system alternatives by utilizing trade studies.

C.3.6.3 Associated Support Items Of Equipment (ASIOE). The Contractor shall identify major items required for the Abrams ACCE vehicle configurations to perform its intended mission. The Contractor shall update the ASIOE List to identify items required for the ACCE vehicle configurations to perform its intended mission. All information required to complete Basis of Issue Plan Feeder Data (BOIPFD) and Data Interchange Requests for these items shall be identified. These items are normally separately authorized by Modified/Table of Organization and Equipment (M/TOE) property book.

C.3.6.4 Manpower, Personnel, Training and Training Devices. The Contractor shall coordinate with PM Abrams and CASCOM to establish a Manpower, Personnel, and Training program. The impact of fielding the system on the existing Manpower, Personnel, and Training structure shall be evaluated by the Contractor and documented. Abrams ACCE vehicle modifications shall be analyzed to ensure maximum use of available Manpower, Personnel, and Training resources. The Contractor shall identify any Manpower, Personnel, Training and Training Devices shortfalls or issues and recommend appropriate resolutions.

C.3.7 Test, Measurement and Diagnostic Equipment (TMDE). Maintenance concepts shall include optimum use of accurate on-board diagnostic capability to include Built In Test (BIT) or Fault In Test(FIT). The BIT/FIT diagnostic capability shall apply to all electronic, electro-optic, electro-mechanical, electro-hydraulic, and electro-pneumatic systems as applicable in the Abrams ACCE. The level of BIT/FIT diagnostic capability shall be IAW the vehicles System Performance Specifications with a 99% fault isolation goal to an ambiguity of one. The Contractor shall integrate BIT/FIT diagnostic capability. The Contractor shall fully document and support embedded systems and software related to the integration of ACCE into the M1A2 SEP vehicle. The software shall not contain proprietary restrictions. No new or unique TMDE support equipment shall be added to the Contract.

C.3.8 DSESETS. The Contractor shall update the Direct Support Electrical System Test Set (DSESTS) to accommodate the new ACCE integration hardware (except DECU 100) and any modified existing hardware. The Contractor shall update hardware and software to maintain consistency with deployed test sets in support of the Abrams M1A2 SEP series vehicles, to include both LRU and SRU diagnostics on DSESTS.

C.4.0 Test and Safety

C.4.1 Integrated Test Support. The Contractor shall develop and manage their test program for the Abrams ACCE integration configuration. Contractors test support program will include both component and vehicle testing.

C.4.2 Design, Developmental Tests, and Assessments. The Contractor shall design, develop, and test systems/subsystems of the Abrams ACCE configuration modified under this Contract to verify conformance to the vehicle System Performance Specification subject to current waivers, deviations and letters of system non-conformance.

C.4.3. Simulation Verification, Validation, Accreditation (VV&A). The Contractor shall use simulations when possible and economically advantageous, in order to demonstrate that the Abrams ACCE meets the requirements of the vehicle System Performance Specification subject to current waivers, deviations and letters of system non-conformance. The simulations shall be of sufficient fidelity for the Contractor to verify, validate, and accredit them. The structure of simulations shall allow the insertion and extraction of component/subsystem/system test data to determine impact on system level performance. The Contractor shall insert component/subsystem/system test data into the simulations to determine impact on system level performance. The Contractor shall maintain and perform configuration management on all Contractor-developed simulations. The Contractor shall update all simulations to reflect the latest configuration of the Abrams ACCE hardware and software.

C.4.4 Test Readiness Review (TRR). The TRR shall be conducted to review the test plans/procedures and status of the associated test articles to assess readiness to enter a formal test program.. The TRR shall be conducted on or about 30 days prior to the start of the test program.

C.4.5 Tests. The Contractor shall document testing activity and provide test support packages that include training for operator/crew and maintenance personnel, technical manuals, spare and repair parts, field service representatives to ensure repair capability to support all testing, and test sites as detailed in the specific test sections below.

C.4.5.1 Contractors Shakedown Test. The Contractor shall prepare and deliver in Contractor format the test plans IAW CDRL A019 and perform a shakedown test on one (1) M1A2 SEP Abrams ACCE configured vehicle. The Contractor shall provide all manpower necessary for operation and maintenance of the vehicle through completion of Contractor test. The Government shall provide technical assistance/maintenance for support of GFE hardware. Testing will be conducted at a Government provided test facility at no cost to the Contractor. The Contractor shall provide on-site test support at Government test sites. The test shall run for a period of eight (8) weeks. The Contractor shall prepare and deliver a Final Test Report IAW CDRL A019.

C.4.5.1.1 System Support Package (SSP). The Contractor shall procure, package, and ship A kit spare and repair parts. The Government shall supply all common spare and repair parts, to include the ACCE B kit and Abrams Adapter kit parts to the Contractor test site.

C.4.5.2 Automotive Test Rig. The Contractor shall prepare and deliver in Contractor format the Test Plans IAW CDRL A023 and perform testing of one (1) Automotive Test Rig vehicle with an early prototype engine installed. The Contractor shall provide all manpower necessary for operation and maintenance of the vehicles through completion of Automotive Test Rig testing. The Government shall provide technical assistance/maintenance for support of GFE hardware. Testing will be conducted at a Government provided test facility at no cost to the Contractor. The Contractor shall provide on-site test support at Government test sites. The test shall run for a period of three (3) weeks. The Contractor shall prepare and deliver a Final Test Report IAW CDRL A023.

C.4.5.2.1 System Support Package (SSP). The Contractor shall procure, package, and ship A kit spare and repair parts. The Government shall supply all common spare and repair parts, to include the LV100 B kit and Abrams Adapter kit parts to the Contractor test site.

C.4.5.3 Government Technical Testing. Testing will be conducted by the Government on Engineering prototype Abrams ACCE vehicles. Testing will be conducted at the Government provided test facilities, APG and YPG. The Contractor will provide technical support through completion of the test for the "A" Kit components. Contractor support will be provided at sixty (60) hours per work week. All other vehicle support will be provided by the Government. The Government will provide personnel necessary to operate and maintain the vehicles throughout testing. This testing may be tailored in the event that sufficient technical test data already exists. The Contractor shall address all integration issues that result from technical testing of the integrated hardware. The Contractor shall provide on-site test support at Government test sites. Test duration for each of the five (5) tanks shall be fifteen (15) months, and the cumulative test duration for all five tanks shall be sixteen (16) months maximum.

C.4.5.3.1 System Support Package (SSP). The Contractor shall procure, package and ship A kit spare and repair parts in sufficient quantities to sustain uninterrupted Government testing. The Government shall supply all common spare and repair parts, to include the B kit and Abrams Adapter kit parts.

C.4.5.3.2 Vehicle Shipment. The Contractor shall ship the Five (5) test vehicles to both the Contractor and Government test sites. After completion of Government test, the Contractor shall ship the three (3) RAM Test Vehicles to Anniston.

C.4.5.3.3 Ground Hop Modification Kits. To support Government testing, the Contractor shall procure, package, and ship two (2) each modification kits for the existing Ground Hop Kit at the Government test sites and provide assembly instructions for the above modification kits. The Contractor shall ship one (1) each Ground Hop mod kit along with assembly instructions to Aberdeen Proving Grounds, and one (1) each Ground Hop mod kit along with assembly instructions to Yuma Proving Grounds.

C.4.5.4 Qualification Testing. The Contractor shall procure hardware and perform qualification testing of A Kit hardware in accordance with its component Qualification Test Plan. Whenever possible, and with the full concurrence of the Government, the Contractor shall

combine First Article Testing with Qualification testing. The Contractor shall advise the COTR at the Final CDR of A-Kit components that are candidates for testing. A Qualification Test Plan shall be prepared and delivered in Contractor format IAW the CDRL A020 for each item undergoing testing. The Government reserves the right to witness testing. Notification of item start of test will be provided to the COTR no later than 10 days prior to start of test. A Qualification Test Report shall be prepared and delivered in Contractor format for each item placed into test IAW the CDRL A020.

C.4.6 Test Incident Reports (TIR) Failure Analysis & Corrective Action Report Upon receipt of a TIR, the Contractor shall assess the failure and shall furnish a failure analysis, if required with the proposed corrective action as set forth in these Contract provisions and IAW the CDRL A021 for all hardware designed/integrated by GDLS. TIR for hardware under the design control of GFE subcontractors will be forwarded to them for failure analysis, and corrective action/closeout. Receipt is defined as the day the TIR is posted to the database.

C.5.0 C-MOD Instructions

C.5.1 Modification Instructions. The Contractor shall prepare C-Modification Instructions which will include, but not be limited to, written instructions and rework drawings. The Contractor shall submit the Modification Instructions to the Government for approval in accordance with CDRL A022.

C.5.2 Modification Instruction Validation. The Contractor shall validate the Modification Instructions on one (1) M1A2 SEP vehicle. This validation shall take place at the Contractors facility. The Government shall be notified a minimum of fourteen (14) days prior to a validation and has the option to witness the validation. The Contractor shall utilize one(1) GFE M1A2 SEP that is already provided, reference Attachment 002.

*** END OF NARRATIVE C 001 ***

Name of Offeror or Contractor: GENERAL DYNAMICS LAND SYSTEMS INC.

SECTION G - CONTRACT ADMINISTRATION DATA

LINE ITEM	PRON/ AMS CD/ MIPR	ACRN	OBLG STAT/ JOB ORD NO	PRIOR AMOUNT	INCREASE/DECREASE AMOUNT	CUMULATIVE AMOUNT
0001AD	A136M58147	AD	1	$ 15,660,972.00	$ 163,164.00	$ 15,824,136.00
	27373533000		3GA581			
				NET CHANGE	$ 163,164.00	

SERVICE NAME	NET CHANGE BY ACRN	ACCOUNTING CLASSIFICATION		ACCOUNTING STATION	INCREASE/DECREASE AMOUNT
Army	AD	21 32040000035R5R02P2737352516	S20113	W56HZV	$ 163,164.00
				NET CHANGE	$ 163,164.00

	PRIOR AMOUNT OF AWARD	INCREASE/DECREASE AMOUNT	CUMULATIVE OBLIG AMT
NET CHANGE FOR AWARD:	$ 83,660,972.00	$ 163,164.00	$ 83,824,136.00